

Claims

1. Circuit for programmable stepless clock shifting comprising:
 - a splitter, receiving a clock reference and generating two 90°-shifted clock phases;
 - an interpolator receiving said two 90°-shifted clock phases and two coefficients, and supplying a programmable phase clock, which has a phase shift with respect to said clock reference that depends only on said two coefficients.
2. Circuit according to claim 1, wherein said splitter comprises:
 - a delay circuit receiving said clock reference and supplying a delayed clock;
 - an adder and a subtractor of said clock reference and said delayed clock, supplying at the output said two 90°-shifted clock phases.
3. Circuit according to claim 2, wherein said splitter further comprises at the output two squarers of said two 90°-shifted clock phases, so as the latter have the same amplitude.
4. Circuit according to claim 2, wherein the delay introduced by said delay circuit is typically $\Delta = 90^\circ \pm 50\%$, and is

$$\Delta \neq \pi + k\pi, \quad k = \{0, \pm 1, \pm 2, \dots\}$$
5. Circuit according to claim 1, wherein said interpolator comprises:
 - a first and second multiplier, respectively receiving one of said two 90°-shifted clock phases and a first and second coefficient;
 - an adder receiving the outputs of said first and second multiplier and supplying said programmable phase clock.
6. Circuit according to claim 5, wherein said first and second coefficient have a value of respectively $\sin\Phi$ and $\cos\Phi$, such that the following relationship is performed:

$$\sin(\omega t + \Phi) = \sin(\omega t)\cos\Phi + \cos(\omega t)\sin\Phi$$
 where Φ is said programmable phase of the programmable phase clock; $\sin(\omega t + \Phi)$ is the frequency of said programmable phase clock; $\sin(\omega t)$ and $\cos(\omega t)$ are the frequencies of said two 90°-shifted clock phases.
7. Circuit according to claim 5, wherein said first and second

coefficient are selected from a memory table, addressed according to the wanted programmable phase.

- 5 8. Circuit according to claim 6, wherein said first and second coefficient are selected from a memory table, addressed according to the wanted programmable phase.